# TEACHERS' VARIABLES AS PREDICTORS OF STUDENTS' ACADEMIC PERFORMANCE AND ATTITUDE TOWARDS MATHEMATICS AMONG SENIOR SECONDARY SCHOOL STUDENTS` IN OGUN EAST SENATORIAL DISTRICT

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## Abstract

*This study investigated the predictive roles of teachers' variables such as gender, qualifications, and teaching experience on students' academic performance and attitudes toward Mathematics among senior secondary school students in Ogun East Senatorial District, Nigeria. Adopting a descriptive survey design, the study sampled 20 Mathematics teachers and 606 SSII students across four local government areas using a multi-stage sampling technique. Data were collected using a Mathematics Performance Test (MPT) and a Mathematics Attitude Scale (MAS). Logistic regression was employed to test two hypotheses: whether students' high achievement and positive attitudes toward Mathematics could be reliably predicted from the selected teacher variables. Results revealed that teachers' qualifications significantly predicted both high achievement (p = .010) and positive attitude (p = .005) toward Mathematics. However, teachers' gender and teaching experience were not significant predictors in either case. Based on the outcome of the study, the study recommends among others the need for professional development and the implementation of student-centered teaching approaches to enhance instructional quality. It also calls for a holistic educational strategy that includes adequate resources and stakeholder collaboration to further support student achievement and attitude in Mathematics.*

**Key Words:** Mathematics Performance, Student Attitude, Teacher Gender, Teacher Qualifications, and Teaching Experience.

## Introduction

Mathematics is regarded as a tool for logical reasoning, analytical thinking, and decision-making, making it an essential discipline in the modern technological age (Aminu *et al*, 2024). According to Ifamuyiwa (2019), Mathematics represents human mental activity, helping to improve perception and understanding of the environment through structured, logical thinking. While Akanni (2015) described it as a symbolic representation of ideas that facilitates logical analysis and problem-solving. In recognition of its significance, it is made a compulsory subject in Nigeria's secondary school curriculum and a prerequisite for admission into tertiary institutions (Aina, 2013). However, despite its importance, students' academic performance in Mathematics reveal fluctuating performance levels, with pass rates often falling below expectations. This can be attested to in table 1

**Table 1: Summary of Students' Performance in the Senior Secondary School Certificate Examination in Mathematics between 2015 and 2024**

| Years | Total Entry | Total Obtained Credits & Above (A1-C6) | % Obtained Credits & Above (A1-C6) | Total Obtained (D7-F9) | % Obtained (D7-F9) |
|---|---|---|---|---|---|
| 2015 | 1,593,442 | 544,638 | 34.18 | 1,048,804 | 65.82 |
| 2016 | 1,544,234 | 597,310 | 38.68 | 946,924 | 61.32 |
| 2017 | 1,559,162 | 666,074 | 42.72 | 893088 | 57.28 |
| 2018 | 1,572,196 | 785,883 | 49.98 | 786,513 | 50.02 |
| 2019 | 1,590,173 | 1020519 | 64.18 | 669,654 | 35.82 |
| 2020 | 1,538,445 | 1,003,668 | 65.24 | 569,654 | 34.76 |
| 2021 | 1,560,261 | 1,274,733 | 81.70 | 285,528 | 18.30 |
| 2022 | 1,601,047 | 1,222,505 | 76.36 | 378,542 | 23.64 |
| 2023 | 1,613,733 | 1,287,952 | 79.81 | 325,781 | 20.19 |
| 2024 | 1,805,216 | 1,301,949 | 72.90 | 503267 | 27.10 |

Source: WAEC (2024).

This unsatisfactory performance poses a significant challenge to students aspiring to pursue Science, Technology, Engineering, and Mathematics (STEM) careers. This raises concerns among educators, policymakers, and other stakeholders. However, Teacher-related variables such as gender, qualification, and teaching experience have been identified among the other variables as key determinants of students` learning outcomes in Mathematics by researchers. The influence of teacher-related factors, particularly gender, on students' academic performance in Mathematics has attracted significant scholarly attention, with mixed findings. While some studies argue that teacher gender plays a substantial role

shaping students' academic experiences due to prevailing gender stereotypes that position Mathematics as a male-dominated subject others perceive male teachers as more competent and female teachers as more nurturing, fostering student confidence (Eze & Okonkwo, 2023; Okafor & Adeniran, 2022).

However, other researchers maintain that teacher gender has little impact, emphasizing instructional quality and teaching strategies as more critical to student success (Obi & Chinedu, 2022). Despite these contrasting views, the effect of teacher gender remains a pertinent area of study, particularly in culturally sensitive contexts such as Ogun State, Nigeria, where societal beliefs may shape students' attitudes toward male and female Mathematics teachers.

Teacher qualification is another critical determinant of student success in Mathematics. Professionally qualified teachers typically possess in-depth subject knowledge, strong pedagogical skills, and effective classroom management strategies, all of which contribute to improved student learning outcomes (Bamigbade & Ojo, 2023). Studies have shown that educators with advanced degrees in education or Mathematics are more likely to implement effective instructional practices that enhance student understanding of mathematical concepts (Adamu & Yusuf, 2022).

Additionally, professional development is vital for maintaining instructional competence. Teachers who engage in continuous training are often better equipped to deliver high-quality Mathematics instruction, which in turn positively influences student performance and motivation (Olawale & Afolabi, 2021). However, the prevalence of under-qualified Mathematics teachers in many parts of Nigeria remains a significant barrier to student achievement (Oyedeji & Balogun, 2022). Investigating the impact of teacher qualification on Mathematics performance in Ogun State is therefore crucial for informing targeted interventions and policy reforms.

Teaching experience also plays a pivotal role in shaping student achievement and attitude in Mathematics. Experienced teachers often exhibit superior subject mastery, classroom control, and a broader repertoire of instructional strategies that accommodate diverse learner needs (Afolayan & Eze, 2023). Empirical evidence suggests that students taught by experienced educators generally perform better due to the teachers' ability to identify and address learning challenges effectively (Idowu & Alabi, 2021). Nonetheless, some researchers argue that experience alone is not sufficient; its impact is contingent on the teacher's capacity to adopt innovative pedagogies and integrate modern technologies into their practice (Ogunleye & Okon, 2022). In Ogun State, where both seasoned and less experienced teachers are present, exploring the relationship between teaching experience and student outcomes is vital for refining instructional approaches and professional development strategies.

At this point, examining the combined effects of teacher gender, qualification, and experience within the educational landscape of Ogun State offers valuable insights into effective teaching practices and their implications for student

achievement in Mathematics. Such research is instrumental in guiding educational policy, improving teacher recruitment and training, and ultimately enhancing the quality of Mathematics education in Nigeria.

**Statement of the Problem**

Despite the critical role of Mathematics in national development and individual career progression, students in Nigerian secondary schools continue to record unsatisfactory performance in the subject. Evidence from WAEC results over the past decade indicates persistent fluctuations in Mathematics achievement, with a significant proportion of students failing to attain credit-level passes. These academic setbacks limit students' opportunities for higher education and career advancement, particularly in STEM-related fields. Several studies have attributed students' poor performance in Mathematics to various factors, including socio-economic status, parental influence, school environment, and student-related variables.

However, teacher-related variables remain underexplored, especially with conflicting findings in existing literature. A deeper empirical investigation into how gender, qualification, and experience predict performance and attitude in Mathematics is thus warranted.

**Objectives of the Study**

The study main objective is to investigate teachers' variables such as gender, qualification, and teaching experience as predictors of students' academic performance and interest in Mathematics among senior secondary school students in Ogun State. Specifically, the study is designed to investigate.

i. If students' high achievement in Mathematics can be significantly predicted from teachers' gender, teachers` qualifications, and teaching experience.
ii. If students' positive attitude to Mathematics can significantly be significantly from teachers' gender, teachers` qualifications, and teaching experience

**The Statement of the Hypotheses**

The following hypotheses were tested in the study:

Ho1: Students' high performance in Mathematics can be significantly predicted from teachers' gender, teachers` qualifications, and teaching experience.

Ho2: Students' positive attitude to Mathematics can significantly be predicted from teachers' gender, teachers` qualifications, and teaching experience.

**Methodology**

The study employed a descriptive survey research design to investigate the influence of teacher-related factors on students' performance in Mathematics. The target population included all senior secondary school II Mathematics teachers and students in public schools within Ogun East Senatorial District. A total of 20 Mathematics teachers and 606 students participated in the study. A multi-stage sampling technique was used: first, Ogun East Senatorial District was purposively selected from the three senatorial districts in

Ogun State. Next, four out of the nine local government areas within the district were randomly selected. From these, 20 public senior secondary schools (five per local government) were purposively chosen based on the willingness of school authorities and teachers to participate. One Mathematics teacher was purposively selected from each school, and students were selected based on the class taught by the chosen teacher.

**Instrumentation**

The study utilised two main instruments: the Mathematics Performance Test (MPT) and the Mathematics Attitude Scale (MAS). The MAT was a 40-item multiple-choice test designed to assess students' achievement in Mathematics, with items derived from past Senior School Certificate Examinations. It was validated by experienced Mathematics teachers and piloted with students outside the main study, yielding a split-half reliability of 0.767.

The MAS, adapted from Tapia and Marsh (2000), measured students' attitudes towards Mathematics using 40 items, the instrument contained demographic information and attitude statements rated on a 4-point Likert scale. It included 29 positively and 11 negatively worded items, with a total score of 160. The instruments were validated by experienced teachers, revised accordingly, and a Cronbach alpha of value of 0.717was obtained, indicating good internal consistency.

The instruments were administered with the help of teacher-research assistants. Data analysis involved logistic regression. This statistical analysis was chosen due to the categorical nature of predictor variables (gender, qualification, and experience). For analysis, both achievement and attitude scores were dichotomized into high/low and positive/negative categories based on the 50th percentile.

**Result**

**Ho1:** Students' high performance in Mathematics can be significantly predicted from teachers' gender, teachers` qualifications, and teaching experience.

Initial results of the enter method of the logistic regression analysis as provided by the Omnibus Tests for Model Coefficients showed that the overall model is significant when all the three predictor variables (teachers' gender, teachers` qualification, teaching experience) were entered $\chi^2 = 7.059$, df = 6, N = 606, $p < 0.05$. For other results, Tables 2, 3 and 4 present the model summary, the final classification and the variables in the equation, respectively.

**Table 2: Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 822.444[a] | .012 | .016 |

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .005.

Table 2, the model summary includes two different ways of estimating $R^2$ (per cent of variance accounted for) as was done in multiple regression. These "pseudo" $R^2$ estimates (0.012 and 0.016) indicate that approximately 1.2% and 1.6% of the variance in whether or not students' high achievement in Mathematics can be predicted from the linear combination of the three predictor variables.

**Table 3 Classification Table**

| Observed | | | Predicted | | |
|---|---|---|---|---|---|
| | | | Percentile Group of achievement | | |
| | | | High Achievement | Low Achievement | Percentage Correct |
| Step 1 | Percentile Group of achievement | High Achievement | 277 | 66 | 80.8 |
| | | Low Achievement | 218 | 45 | 17.1 |
| | Overall Percentage | | | | 53.1 |

a. The cut value is .500

The classification table 3 indicates how well the combination of the predictor variables predicts high achievement. In this study, the emphasis was on predicting, from the three predictors, whether or not students would have high achievement in Mathematics. From the classification table, 53.1% of the participants were predicted correctly. The independent/covariate variables were better at helping in predicting students who would have high achievement (80.8% correct) than those who would have low achievement (17.1% accurate).

**Table 4 Variables in the Equation**

| | B | S.E. | Wald | Df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Teachers' Gender | .231 | .184 | 1.577 | 1 | .209 | 1.260 |
| Teachers` Qualification | -.466 | .181 | 6.643 | 1 | .010 | .628 |
| Teaching Experience | -.057 | .180 | .101 | 1 | .751 | .944 |
| Constant | .203 | .474 | .183 | 1 | .669 | 1.225 |

a. Variable(s) entered on step 1: Teachers' Gender, Teachers` Qualification, and Teaching Experience.

Results in Table 4 show that only teacher`s qualification is significant. The Exp (B) shows that the odds of predicting students' high achievement increase by about .628 for every one-unit increase in the teachers` qualification. However, teachers` gender and teaching experience are insignificant.

**Ho2:** Students' positive attitude to Mathematics can significantly be predicted from teacher-initiated activities, student-initiated activities, school type, teachers' gender, teachers` qualifications, and teaching experience.

Initial results of the enter method of the logistic regression analysis as provided by the Omnibus Tests for Model Coefficients showed that the overall model is significant when all the three predictor variables (teachers' gender, teachers` qualification, and teaching experience) were entered $\chi^2 = 8.653$, df = 3, N = 606, $p < 0.05$. For other results, Tables 5, 6 and 7 present the model summary, the final classification and the variables in the equation, respectively.

**Table 5 Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 831.118[a] | .014 | .019 |

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Table 5, the model summary includes two different ways of estimating $R^2$ (per cent of variance accounted for) as was done in multiple regression. These "pseudo" $R^2$ estimates (0.014 and 0.019) indicate that approximately 1.4% and 1.9% of the variance in whether or not students' positive attitude in Mathematics can be predicted from the linear combination of the three predictor variables.

**Table 6: Classification Table**

| Observed | | | Predicted | | |
|---|---|---|---|---|---|
| | | | Percentile Group of Attitude | | |
| | | | Positive Attitude | Negative Attitude | Percentage Correct |
| Step 1 | Percentile Group of Attitude | Positive Attitude | 204 | 92 | 68.9 |
| | | Negative Attitude | 178 | 132 | 42.6 |
| | Overall Percentage | | | | 55.4 |

a. The cut value is .500

The classification table 6 indicates how well the combination of the predictor variables predicts a positive attitude. In this study, the emphasis was on predicting, from the six predictors, whether or not students would have a positive attitude toward Mathematics. Overall, 55.4% of the participants were predicted correctly. The

independent/covariate variables were better at helping predict students who would have positive attitudes (68.9% correct) than those who would have negative attitudes (42.6% accurate).

**Table 7 Variables in the Equation**

| | B | S.E. | Wald | Df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Teachers' Gender | .028 | .182 | .024 | 1 | .876 | 1.029 |
| Teachers` Qualification | -.506 | .181 | 7.844 | 1 | .005 | .603 |
| Teaching Experience | -.006 | .178 | .001 | 1 | .975 | .994 |
| Constant | .834 | .473 | 3.112 | 1 | .078 | 2.303 |

a. Variable(s) entered on step 1: Teachers' Gender, Teachers` Qualification, and Teaching Experience.

Results in Table 7 show that only teacher`s qualification is significant. The Exp (B) shows that the odds of predicting students' positive attitude increase by about .603 for every one-unit increase in the teachers` qualification. However, teachers` gender and teaching experience are not significant.

## Discussion

The findings revealed that teacher qualification significantly predicts students' achievement and attitudes toward Mathematics, while teacher gender and experience do not have a significant impact. This supports earlier research by Goldhaber (2016); and Ernest (2019) who emphasised that well-qualified teachers, equipped with advanced training and credentials, are more likely to enhance student learning and foster positive attitudes through effective, engaging instruction. However, the negative coefficient (-0.466 & -0.506) suggests that qualifications alone are insufficient without sound pedagogical practices.

The lack of significant influence from gender aligns with studies of Chetty *et al*. (2024) indicating that teaching effectiveness relies more on skills and confidence than on gender. Similarly, the non-significant effect of experience challenges traditional views, echoing scholars like Rivkin *et al*. (2022); Desimone & Garet (2015), who argue that teaching experience must be complemented by ongoing professional development to remain effective and positively impact students.

## Conclusion

The study found that teacher qualifications significantly influence students' achievement and attitudes toward Mathematics in Ogun State, Nigeria, while teacher gender and experience showed no significant effect. This highlights the importance of academic training and pedagogical expertise over demographic factors. The findings also emphasize the need for continuous professional development to enhance instructional effectiveness. Additionally, the modest variance explained by the predictor variables

suggests that other factors—such as school resources, student motivation, parental support, and curriculum design—also contribute meaningfully to students' mathematical outcomes.

**Recommendations**

Based on the results of the study, the following recommendations are proposed to enhance students' achievement and attitude toward Mathematics in Ogun State, Nigeria:

1. Educational policymakers should prioritise the recruitment of well-qualified Mathematics teachers. Teachers should possess at least a bachelor's degree in education or Mathematics, and incentives should be provided for teachers to pursue advanced degrees and certifications.
2. Workshops, seminars, and training on student-centered instructional strategies, technology integration, and differentiated learning should be encouraged to enhance teaching effectiveness.
3. Educators should be trained to create inclusive and supportive learning environments that benefit all students, regardless of the teacher's gender.
4. School administrators should ensure that adequate learning materials, well-equipped Mathematics laboratories, and technology-enhanced learning tools are available to support effective Mathematics instruction.
5. The Ministry of Education and relevant stakeholders should develop policies that mandate regular evaluation of teacher qualifications and instructional effectiveness.

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